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PRODUCTION

Editor's Comments

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Insects and crop diseases get our focus during the hot days of summer. The Crop Protection Laboratory has been busy of late with samples of these pests, as well as samples showing some herbicide injury and poor nodule formation. To have a sample analyzed in the Crop Protection Lab, look at the Saskatchewan Agriculture website at: www.agriculture.gov.sk.ca/programs-services and scroll down to Crop Protection Laboratory Services.

Our insect pest surveys are underway. The Bertha armyworm counts are coming in and the first map of the season will soon be available. Check the Saskatchewan Agriculture website for the latest map at: www.agriculture.gov.sk.ca/ and click on Production / Crops-Insects and scroll down to *Bertha Armyworm Map*. If you are a Bertha armyworm trap co-operator, please remember to forward your land locations and weekly counts to Sean Miller at 1-888-323-7842 or fax at 306-787-0428.

Wheat midge was forecast to be a major pest problem in the Prairies this season, and it is now emerging in many areas. Check out the wheat midge update in this edition of the CPN. For information on crop protection products, check out the *Guide to Crop Protection 2008* at www.agriculture.gov.sk.ca/Guide_to_Crop_Protection. Saskatchewan Ministry of Agriculture's *Weekly Crop Report* can be seen at: www.agriculture.gov.sk.ca/Crop-Report.

NOTE: Throughout this document, you will see that some publications are in blue font and underlined, indicating links to website information. If you are reading this off your computer screen, press the CTRL button and click your cursor on the link to take you directly to the website. ☺

Crop Production News is a biweekly publication prepared primarily by provincial specialists with the Crop Development Branch of the Saskatchewan Ministry of Agriculture. The newsletter includes a compilation of articles related to entomology, plant pathology, weed science, soils and agronomy issues.

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Crop Protection Lab Update

By Grant Holzgang, Supervisor, Crop Protection Laboratory

Halo blight (*Pseudomonas syringae* pv. *coronafaciens*) has been detected on oat. Often, strong winds combined with moisture are precursors to development of this disease. The mechanical injury to the leaves allows this bacterium to colonize leaf tissues if there is free moisture available. There is no practical control, and warmer dry weather should limit disease progression.

Tan spot (*Pyrenophora tritici-repentis*) is relatively common in wheat now. Thrips have been seen in barley. Inspecting fields to see if populations are high enough to warrant control is important, and crop staging is also significant. More information on barley thrips is available on pages 359 and 360 of the 2008 Guide to Crop Protection on the Saskatchewan Agriculture website.



Downy mildew (*Peronospora viciae*) has been recovered from lower leaves of pea (Figure 1). This pathogen requires wet conditions, and is rarely a significant problem on the Prairies. Oospores can persist for more than 10 years in the soil, and pea planted on previously infected fields will be subject to this disease if wet conditions occur again.

Figure 1. Downy mildew on pea
Source: Saskatchewan Agriculture

Also on pea, Septoria leaf blotch (*Septoria pisi*) is frequently seen on lower leaves. Both Ascochyta species (*A. pinodes* and *A. pisi*), the causal agents of Mycosphaerella/Ascochyta blight, have been detected at low levels on lower leaves.

Numerous pea samples have been submitted showing chlorosis and stunting due to nitrogen deficiency caused by very poor nodulation. In many cases, the roots are infected by the root-rotting organisms *Fusarium* and *Rhizoctonia*. Root rot levels vary from light to severe. Stressed plants are more susceptible to root rot. It is suspected that the cool and dry conditions this spring inhibited *Rhizobium* activity as well as plant development. Because starter fertilizer is rarely used in pea production, the plants have probably utilized most of the available nitrogen by now.

No Ascochyta or Anthracnose has been detected yet on the lentil samples submitted for disease analysis, but, with crop canopies now closing in, the threat becomes more elevated.

There have been a few strawberry samples submitted with severe infestations of spider mites. Drier conditions tend to favour mite development and survival. Their feeding results in chlorotic-looking leaves. The mites are easily seen with a hand lens on the undersides of the leaves. ☼

Success of the Ascochyta Project 2008

By Faye Dokken, Provincial Specialist, Plant Diseases

Reports indicate that, despite initial delays, most chickpea crops are flourishing with the moisture received in early June in southern Saskatchewan. According to the Crop Report for June 23, 2008, crop reporters rated an average of 75 per cent of chickpea crops across Saskatchewan as 'good' to 'excellent' condition. Producers should continue to regularly scout (Figure 1) their crops for disease, and strive to make appropriately timed fungicide applications as the crops progress.



Figure 1. Scouting chickpea fields. Katie Olsen and Faye Dokken.

Source: Saskatchewan Agriculture

The 2008 Chickpea Ascochyta Sentinel Plant Project is now winding down. This project was designed to develop an early warning system for Ascochyta of chickpea, which would aid in timing the critical first fungicide application. This year, four field locations were selected around Swift Current and Cabri, two areas with a history of Ascochyta blight. Chickpea growers Floyd Carefoot, Jim Moen and Gary Braaten graciously allowed sentinel sites in their fields. Thank you to all of the

volunteer agronomists and grower co-operators who participated this year!

Susceptible 'sentinel' (look-out) chickpea plants were pre-grown to the early bloom stage in a greenhouse at Agriculture and Agri-Food Canada (AAFC) in Swift Current. Cal McDonald, Kristi Wall and other supporting research/summer staff at AAFC did a great job of planning and carrying out the project procedures! Every few days from early May to mid-June, sentinel plants were placed near inoculum sources in fields with chickpea residue. Following three to four days of field exposure, the plants were returned to a humidity chamber for two to three days, and then transferred to a growth chamber for four to six days to promote symptom development. Disease severity was assessed by counting the number of lesions (Figure 2) on each sentinel plant. Disease risk assessments were sent to agronomists and grower co-operators twice a week for the project's duration.

This year, lesions were found on every batch of sentinel plants, which means that *Ascochyta rabiei* spores were present near chickpea residue as early as May 9 to 13, and remained throughout the spring. The highest numbers of Ascochyta lesions were observed on the final batch. Rainy conditions prevailed during June 10 to 13, the period of time that these sentinel plants were in the field, and the rain splash and high humidity was very favourable for disease spread and infection. By the time the last disease risk update was sent on June 23, Ascochyta symptoms had been reported in some commercial

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Success of the Ascochyta Project 2008 (Continued from page 3)

crops as well, with an indication that producers had made or were planning their first fungicide application at that time.

While this project discovered disease inoculum earlier than expected this year, commercial crops were delayed due to dry, cool conditions, and therefore fungicide applications may have been postponed until the crops reached the appropriate seven- to 10-node stage, despite the disease risk. Additional fungicide applications usually continue every seven to 10 days after the first application, if conditions continue to be

favourable for disease development. If disease risk is high with moist weather conditions expected, this interval may be decreased to five to seven days. Alternatively, as the crop advances and weather conditions become hot and dry, this interval may be increased to three weeks or more.

Three main factors should be considered when deciding when to stop applying fungicides: a) crop stage, b) disease severity or other crop damage and c) value of the crop. If the disease was not effectively controlled earlier in the season, it is doubtful that a late fungicide application will be satisfactory. Crops slightly damaged at the seedling or vegetative stage are usually worthwhile to protect, but it is likely too late to salvage crops severely damaged during pod development. While crops heavily damaged by disease or other stresses such as hail may recover on their own, it may not be worth protecting if development is delayed. Likewise, foliar fungicides are not likely to be beneficial when applied after the crop has started to mature, as any late applications to protect new growth may only delay crop maturity. Depending on the input costs already spent and the potential yield loss due to disease or other damage, you must determine how many applications will effectively protect seed yield and quality, without breaking the bank. The following calculation can be used to assess the economic threshold. Spraying is warranted as long as the yield loss per acre value remains higher than the cost of fungicide application.

$$\text{Yield Loss / acre (\$)} = \text{per cent Potential Yield Loss} \times \text{Estimated Yield (lb/acre)} \times \$ / \text{lb.}$$



Figure 2. Ascochyta blight lesion (left) and spores (right). Source: Saskatchewan Agriculture

Forage Seed Harvesting Techniques

By Michel Tremblay, Provincial Specialist, Forage Crops

Forage seed is a perennial crop, but is harvested in a manner similar to annual crops. There are several factors that must be considered to successfully harvest forage grasses.

The first step to a successful grass seed harvest is correct timing of swathing. Grass seed crops are particularly susceptible to shattering. Swathing too late can result in harvest losses of up to 50 per cent. In meadow brome grass, a popular grass seed crop in Saskatchewan, swathing should be done when the seed reaches the hard dough stage, when the seed panicle moisture content is about 50 to 55 per cent. At this stage, the seed heads are brown and the upper stems of the seed stalks are turning brown. Some of the seed in the upper seed head will shatter if the seed head is struck against the palm of the hand. Swaths are usually ready to be combined (Figure 1) in approximately seven days, depending on the weather.



Figure 1. Combining creeping red fescue.
Source: Alberta Agriculture and Rural Development.

Combine settings will vary, depending on the type of combine and the species of grass being combined. In meadow brome grass, combine cylinder speed should be 700 to 800 rpm, with a fan speed setting of 400 to 500 rpm. Combine ground speeds are slower with grass seed, compared to annual crops. Ground speeds over three kilometres per hour may result in excessive seed loss. Seed moisture content should be 10 per cent or less for combining. Many grass seeds are quite chaffy and difficult to handle, especially at moisture levels higher than 10 per

cent. Seed should be placed in a bin with aeration to cool the seed and prevent heating and the consequent loss of germination. Grass seed should be stored at low moisture levels to enhance seed viability.

A well-threshed sample should have all the seeds separated from the rachis, the lemma and palea remnants still attached to the seed, and should not contain any peeled seeds. Dockage levels in a well-combined sample of meadow brome grass range from 10 to 15 per cent.

Timing field operations, setting equipment properly and handling the seed correctly following harvest will maximize the yield of clean, viable forage grass seed. ⚙

Assessing Damage Symptoms in Lentil

By Dale Risula, Provincial Specialist, Specialty Crops

Damage symptoms can be easy to see in your field, but knowing what caused the problem can be more difficult. Crop damage can be caused by disease, insects, pesticides or physiological injury. Lentil producers encounter problems with diseases each year. Anthracnose and Ascochyta are the most common causes.

This year there have been some lentil damage due to physiological reasons.

Insects, fungal infections, bacterial infections and viruses are problem sources that are referred to as *biotic*. They originate with living organisms invading the tissue and/or vascular (systemic) system of a plant. Problems may also be caused by *abiotic* or non-living sources. Abiotic sources include lightning strikes, machinery damage, hail damage, sun scald, improper seeding adjustments, malfunctioning seed or fertilizer distribution, saturated soil, excessive heat, drought or chemical damage.

Assessing crop problems is much like conducting a crime scene investigation. It requires digging into the plants' surroundings, the symptoms on the plant and the field history to try to find the correct answer to the problem. Sometimes a quick assessment may overlook the true source of the problem.

Besides disease and insects, extremes in weather can cause significant amounts of damage in some years. Isolating where the damage is located on the plant can help identify the source of the problem. As you study the injured plants, you can begin to associate damaged areas with recent events that could have contributed to the problem.

If a time-specific event is the cause of a problem, you will probably find damage to a very limited area of the plant (i.e. a damaged area that is isolated and not spreading). A possible source for this kind of damage might be strong winds, heavy rain or hail, or some other abiotic factor. If symptoms have spread throughout the plant and to surrounding areas within the field, you are most likely dealing with a biotic source of damage such as fungal infection or insect infestation.

Some symptoms may be similar for both biotic and abiotic sources. For example, if the problem is associated with herbicide residue, you may see the plant continue to show signs of damage following rain. The source is abiotic (non-living), but the damage continues to increase because the residue continues to be absorbed and move throughout the plant's vascular system.

Extreme temperature variations have the potential to cause damage to new tissue on lentil plants; especially new tissue that has not been conditioned to withstand these extremes. For example, heat canker of lentil has been reported at various locations this spring.

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Assessing damage symptoms in lentil (Continued from page 6)

In Figure 1, damage to lentil was limited to a small zone on the plant and it was not spreading.

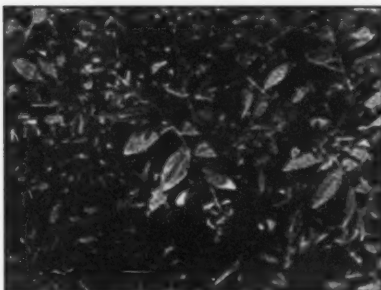


Figure 1. Lentil damage symptoms.
Source: Kevin Zerr, Agri-Care

Symptoms were localized to the tips of each leaflet. Water droplets from a recent rainfall flowed to the leaf tips, creating a prism which concentrated the sun's energy like a magnifying glass. The subsequent build up of heat on the plant tissue damaged cell membranes and caused severe injury to that part of the plant.

Physiological injuries, such as those described above, can cause significant amounts of damage. So, it is important to gather, record and review the history of the field, current weather data, insect situation,

conditions for diseases and symptomology (e.g. look for pycnidia or other plant disease symptoms). This information will help you accurately diagnose the problem to make better decisions about the actions you may take.

The Crop Protection Laboratory can help to accurately determine the cause of crop damage. Information about the lab and how to submit a sample is available on the Saskatchewan Agriculture website. ☼

Wheat Midge Update

By Scott Hartley, Provincial Specialist, Insects and Vertebrate Pests

The forecast for wheat midge infestations for 2008 indicated high risk to a large area of the province. However, cool, dry conditions resulted in a delay in emergence. We received reports of the first emergence of midge in east-central and northeast regions on July 3 and 4. These were likely male midge that are the first to emerge and usually precede female emergence by about three to four days, depending on climatic conditions, primarily temperature.

Wheat crops are susceptible to midge damage from when the head becomes visible as the boot splits, until anthesis (flowering) (Figure 1). Wheat builds up a natural resistance to the midge through increased levels of ferulic acid that tends to coincide with anthesis. During field scouting, this is marked by the extrusion of the yellow anthers.

Due to crop stage variations, some situations may require control measures while, in others, the wheat is no longer susceptible to damage. There will also be variation among tillers.

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Wheat Midge Update (Continued from page 7)

The majority of the yield from a wheat plant will come from the main stem and first two tillers; therefore, these are the plant components that are most important to monitor and protect.

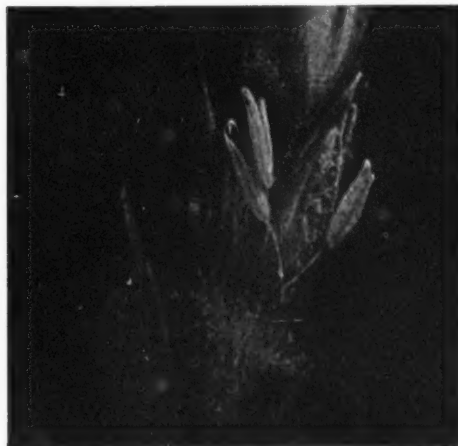


Figure 1. Wheat Anthesis
Sources: Agriculture and Agri-Food Canada,
Saskatoon

Insecticide applications at late flowering will be an unnecessary expense and will have a negative effect on the beneficial parasites. Caution should also be taken when applying insecticides in the vicinity of crops where pollinators may be foraging. For safety reasons, it is important not to re-enter the treated area for at least 48 hours, and then only when wearing appropriate safety gear, as the insecticide can be absorbed through clothing.

For more information on wheat midge control, consult the Saskatchewan Agriculture website at: www.agriculture.gov.sk.ca/, and click on Production/Crops-Insects, and scroll down to Wheat Midge; or call the Agriculture Knowledge Centre at 1-866-457-2377. ☼

Aphids on Canaryseed

By Blaine Recksiedler, Provincial Specialist, Cereal Crops

Saskatchewan is a major producer and exporter of canaryseed. According to the most recent Statistics Canada estimates, 380,000 acres have been seeded in 2008 in Saskatchewan, down from 425,000 acres in 2007. This represents over 90 per cent of the canaryseed production in Canada. The market is characterized by large price swings, quite often affected by production fluctuations in Saskatchewan. Current prices are in the upper end of the cycle.

Canaryseed is a cool season crop that does best in long, warm days and cool nights. It matures in approximately 105 days. Canaryseed is shallow-rooted, and is more sensitive to heat and less drought- and salt-tolerant than wheat. It does best on heavy, moisture-retentive soils.

Aphids can be a perennial problem, depending on severity and timing of infestation. It is important for producers to walk their fields to monitor for this pest. This should be started during the early stages of heading.

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Aphids on Canaryseed (Continued from page 8)

There are many aphid species that tend to have fairly specific host plants. When found in canaryseed, infestations are usually composed of bird cherry-oat and English grain aphids. The bird cherry-oat aphid is dark green to purple, and the English grain aphid is light green. Aphids often do not occur in sufficient numbers to cause economic loss, but, if southerly airflow from the U.S. provides an early infestation, significant crop damage can occur. The sooner the insects arrive, the higher the potential for damage, as this allows more time for populations to become established. Aphids can often be found along the stem inside the canaryseed head. When making counts to determine infestation levels, the head should be bent and closely inspected. The aphids are found in various sizes, depending on the stage of the life cycle (Figure 11). The bird cherry-oat aphid will also feed on the stems, underside of leaves and in the canaryseed boot before heading.

Research has not determined economic thresholds for aphid infestations in canaryseed in Saskatchewan, but research from the U.S. and in other cereal crops indicates that about 10 to 20 aphids on 50 per cent of the stems prior to the soft dough stage may cause enough crop damage to warrant insecticide application. Depending on the costs of the insecticide, the higher current crop prices will shift the threshold to the lower end of this range. Malathion and dimethoate products (e.g. Lagon and Cygon) are registered for control of aphids in canaryseed. Note that products may have different label recommendations. Check the labels for information related to specific registered uses.

If aphids are present, the insecticide should be applied at early heading. Aphids do little economic damage at the soft dough stage of the seed, so spraying after this stage is not recommended. More information on control of aphids in canaryseed can be found in the Saskatchewan Ministry of Agriculture's *2008 Guide to Crop Protection*, or by calling the Agriculture Knowledge Centre at 1-866-457-2377. ☼

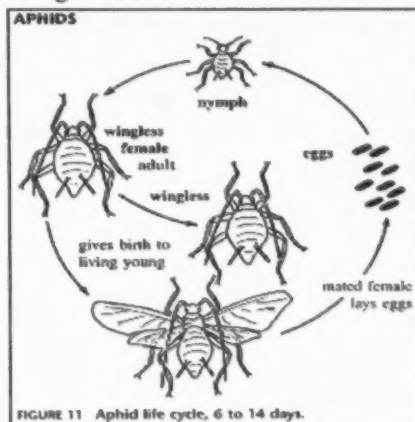


FIGURE 11 Aphid life cycle, 6 to 14 days.

Take Care Around Horticulture Crops

By Connie Achtymichuk, Provincial Specialist, Vegetable Crops

This is the time of year that the Crop Protection Laboratory receives samples of fruit, vegetables and other broadleaf crops that are displaying injury symptoms of herbicide drift.

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Take Care Around Horticulture Crops (Continued from page 9)

Every year, the Ministry of Agriculture receives numerous reports of unusual colouration and twisting of leaves on potatoes (Figure 1), tomatoes and pepper plants from commercial producers. Horticulture crops are extremely sensitive to small amounts of Group 4 herbicides such as 2,4-D. If the plants do not die, they become severely deformed. Fruit or tubers produced on these plants are not marketable because of their visual appearance and concerns over possible residues. Crops are also susceptible to drifting glyphosate applied as pre-harvest weed control on field crops. Farm shelterbelts and yards are also very susceptible to drift.



Figure 1. Potato crop.
Source: Saskatchewan Agriculture

The problem of spray drift is not limited to herbicides. Improper application of an insecticide can wipe out a neighbouring honey operation.

Drift management techniques will help minimize most problems that might develop. These include leaving buffer areas, managing droplet size, paying attention to wind speed and direction and managing boom height.

Temperature inversions form when soil warmed by the sun warms a shallow area just above the surface, while the air above it cools. A boundary is created between the warm and cool air that prevents mixing. Inversions produced during very calm conditions allow small droplets of herbicide to remain suspended in the air for long periods of time. When the air begins to move again, the droplets can slide across the landscape and over potentially sensitive areas. They can also slide down slopes and along water runs before settling onto the surface. Sometimes inversions can even lift over hedges.

Pre-harvest herbicide applications will soon be underway. It is the responsibility of all producers and applicators to be mindful of their neighbours' operations. Be aware of the effects of the pesticides being applied to the target field and the effect that any drift might have on neighbouring crops.

Horticultural crops are extremely sensitive to many herbicides, and are typically of a high value per acre. The liability for damage to these small acreage operations could be much greater per acre than for field crops, so applicators should be particularly careful around them. After all, it's nice to have peas among neighbours! ☼

The *Crop Production News* is a regular publication of the
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